# THE HYGIENE OF TUBERCULOSIS *

CLARENCE L. WHEATON, M.D.
Physician with the Chicago Tuberculosis Institute at the Central Free Dispensary, Rush Medical College, etc.; Member of the International Congress on Tuberculosis
CHICAGO

The widespread sanatorium movement has demonstrated the fact that tuberculosis can be arrested in any climatic zone. This, however, should not lead us to ignore valuable scientific facts relative to the influence of certain well-known climates in the arrest of consumption.

As Hippocrates has well said: "Whoever desires to understand medicine thoroughly can by no means neglect the study of the seasons with their variations of the winds, both as to heat and cold, and those peculiar to certain regions."

As the able surgeon knows well his anatomy, so the physician should acquaint himself with meteorologic facts and climatic data relative to well-known health resorts. In climatology there are fundamental principles, a knowledge of which would be of great value to every physician.

The contributions of such men as Solly, Dennison, Vivenat, Copeland and Lombard have been of decided value and a stimulus to others for further research and investigation in this important subject.

TABLE SHOWING CLIMATIC CHARACTERISTICS OF VARIOUS LOCATIONS

| | Elevation. | Latitude. | Soil. | Temperature. | | | Humidity. | Cloudy days. |
|---|---|---|---|---|---|---|---|---|
| | | | | Annual | Dec. | Aug. | Rainfall. | |
| Santa Fe, N. M. | 7,000 | 33.34 | Sand and Adobe | 51 | 32 | 71 | 16.1 | 52 |
| Colorado Springs | 6,000 | 38.51 | Gravel | 47 | 28 | 70 | 15.2 | 58 |
| Denver, Colo. | 5,280 | 38.76 | Gravel and Sand | 49 | 29 | 76 | 14.1 | 63 |
| Flagstaff, Ariz. | 6.300 | 34.26 | Gravel and Sand | 53 | 33 | 74 | 16.0 | 51 |
| Oracle, Ariz. | 4,650 | 32.50 | Gravel and Adobe | 60 | 44 | 82 | 17.7 | — |
| Las Cruces, N. M. | 3,850 | 32.17 | Adobe | 59 | 46 | 77 | 7.2 | 18 |
| Tucson, Ariz. | 2,300 | 32.14 | Sand and Gravel | 69 | 50 | 83 | 12.0 | 57 |
| Phœnix, Ariz. | 1,100 | 32.28 | Adobe | 70 | 52 | 90 | 9.0 | 52 |
| Yuma, Ariz. | 130 | 32.44 | Sand | 72 | 56 | 96 | 3.1 | 18 |

Most men, I believe, recognize as ideal for the tuberculous that climate possessing the greatest possible amount of sunshine, a pure, dry atmosphere, light winds and porous soil, with elevation sufficient to increase the respiratory act in depth and vigor. All students of climatology recognize the germ-destroying power of sunlight, its power to destroy anaërobic bacteria; the use of the blue, violet and ultra-violet rays of light is an argument as to the value of sunlight in the arrest of tuberculosis. The mental effects of sunshine can not be overlooked, such as the promotion of cheerfulness of disposition and repose of mind in those compelled to live an out-of-door life. Solar light reddens the blood and cures chlorosis in the same manner as it restores the color to plants bleached in darkness.

Downs and Blunt, in 1877, reported to the Royal Society of London the results of their experiments relating to light, as follows:

> 1. It is inimical to the development of bacteria and the microscopic fungi associated with putrefaction and decay; its action on the latter organisms being apparently less rapid than on the former.
>
> 2. Under favorable conditions it wholly prevents that development, but under less favorable it may only retard.
>
> 3. The preservative quality of light, as might be expected, is more powerful in the direct solar rays, but it can be demonstrated to exist in ordinary diffused daylight.

As for sun heat, Solly says:

> Its direct physiologic effects are to increase growth, to lessen the amount of food needed, and to diminish muscular force; the important indirect effects of sun heat are to induce patients to live more out-of-door lives and to keep doors and windows open.

In the Philippine Islands, 15 degrees north of the equator, sunlight and sun heat do not exert any untoward influence on the native population. Dr. D. A. Appel, of the Army Medical Corps, has recently informed me that his observation in the Philippines lead him to believe that tuberculosis is not as prevalent there as it is in our large cities; the poorer classes live mostly in shacks in which ventilation can not be prevented, even where the doors and window shutters are closed.

Atmospheric clearness and transparency, the so-called diathermancy, is a test of purity. Dennison, in his Colorado observations of 1876, proved that it steadily increases with elevation by consecutive thermometric observations of the sun's influence at different heights, and near sea level, and under conditions calculated to exclude radiation.

The increasing purity of the atmosphere, the absence of dust and smoke, or of moisture, with its attendant infusoria is a decided feature of elevation.

Tyndal has shown that each higher successive stratum contains less and less of infusoria. Mequel of Paris found that with rise in elevation the number of bacteria in 10 cm. space was reduced from 5,500 in the Rue de Rivoli, Paris, and 7,600 in the park of Montisuris, near by, to 600, 85 and 8 respectively in a hotel at Thunet, 560 meters elevation, near Paris, while at 2,000 to 4,000 meters high there were none. Purity, therefore, goes with dryness, coldness and rarefaction of the air incident to elevation. Individuals arriving at a high altitude of approximately a mile above the sea experience an increase in both depth and frequency of respiration; after acclimatization there is a fall in the frequency of respiration, but the breathing continues deep. Spirometric records prove this fact; also, the increased size of the chest in both adults and children.

Time will not permit of an exhaustive consideration of this subject; elevation above the sea, dryness of the air, sunshine, winds, variability of the air temperature, electricity of the atmosphere, are all attributes of climate, and contributing factors in the arrest of tuberculosis. Colorado, northern New Mexico and northern Arizona are illustrative of the high altitudes, while Las Cruces, New Mexico, and El Paso, Texas, furnish a

---

* Read in the Section on Hygiene and Sanitary Science of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908.

Downloaded From: http://jama.jamanetwork.com/ by a University of Calgary User on 05/24/2015

moderate altitude. Tucson, Arizona, Phoenix, Arizona, and Yuma are comparatively low. The accompanying table of elevation, soil and latitude is appended for reference. I quote from the editorial in *American Medicine,* November, 1907, soon after the publication, in the *New York Dietetic and Hygienic Gazette,* of my article on this same subject:

> And what can be said of Dr. Clarence L. Wheaton of Chicago, who says that the ideal climate would be the one possessing the greatest possible amount of sunshine when he should know that for a third of a century there has been obtained the best results in the world in the Adirondacks, which are noted for the absence of sunshine, and if he really exposes his patients to what is now known to be harmful to them, we commend his cases to the trustees of that institution.

We have here evidence of commendable loyalty to the home climate, but it is seemingly unwise to attribute "the best results" in the world to a given health resort; the physician endeavoring to substantiate such a claim would meet with tremendous opposition from all quarters. As for sunlight or even sun heat being harmful to tuberculous patients when properly utilized, the facts herewith presented speak for themselves, no contributions to the literature covering this subject, either by climatologists or phthisiotherapists, have been presented, so far as I am aware, denying the effects here attributed to the sun's influence. The government has established at great expense in Colorado and New Mexico sanatoria for the treatment of tuberculous soldiers and sailors. These respective climatic zones approach our ideal in the choice of a climate, and the untoward effects of sunlight have not as yet been reported.

To one enlisted in the antituberculosis crusade in a great city like Chicago the study of climatology is of interest and value from a scientific standpoint alone; the rôle it plays here in the solution of the tuberculosis problem is an insignificant one.

The chain of dispensaries established by the Chicago Tuberculosis Institute and their affiliation with regularly organized relief and aid societies will eventually solve the medical and sociologic problem as it is presented to the worker here. The state sanatorium will in time be constructed and enable us properly to utilize the home climate in arresting tuberculosis. The results of the sanatorium treatment in so-called unfavorable climates has far exceeded our expectations. Let us be frank to admit that some climates are better than others; that they possess certain attributes exerting a decided beneficial influence in pulmonary disease; but with all our knowledge of these facts we must know that most of those afflicted should avail themselves of the home environment, for the end of the bow of promise for the average traveling consumptive rests on the mystic shores of the spirit land.

My long residence in Colorado and study of climatic conditions throughout the southwest have convinced me that often without regard to the circumstances of the patient or stage of his disease, it has been the custom to prescribe change of climate. Nothing can be more cruel or irrational than this; in the case of those too poor to afford the expense incident to a change, it opens the door to regrets which are likely to harass the mind when it most requires repose. In most instances the disease progresses more rapidly to a fatal termination, and in many cases the expatriated invalid finds not only a foreign climate but a foreign grave.

There are hundreds of human wrecks scattered over the desert waste of the great southwest, and thousands wandering in the mountain wilderness of some distant state, struggling for the mere necessities of life, with death an inexorable companion, and all the future dimmed by the shadow of waiting Charon.

Our knowledge of these facts must impress on us all the responsibility we assume in prescribing change of climate, yet let us recognize the fact that in selected cases climate is not all fallacy, and that it plays its rôle in the hygiene of tuberculosis.

39 Pine Grove Ave.

---

# THE CONJUNCTIVAL TUBERCULIN REACTION AS A MEANS OF DIAGNOSIS AND CONTROL *

FRANK SMITHIES, M.D.
ANN ARBOR, MICH.

AND

R. E. WALKER, M.D.
Captain U. S. Marine Corps, Retired; Formerly First Assistant in Internal Medicine, University of Michigan
DELAND, FLORIDA

It should be plainly stated and clearly understood that tuberculin tests of whatever nature are but confirmatory evidence for the substantiation of clinical findings. A large proportion of cases of pulmonary tuberculosis are capable of being diagnosed by the practitioner from examination of the local focus and consideration of the clinical history. In these cases fever, emaciation, cough with sputum more or less characteristic, and consolidation or destruction of lung tissue are sufficient evidence. These cases, however, form the long list of incurables, and diagnosis has its main importance in so far as it affects prophylaxis. It is in incipient or early involvements that the greatest amount of effort should be exerted toward diagnosis, because these patients are to a large extent curable, and cure means the ridding a community of a class of persons inimical to public health and public economy. These incipient cases of tuberculosis frequently present many elements of doubt as to diagnosis even after the most thorough physical scrutiny. If they are not tuberculous it is a great injustice to ostracise them; if they are tuberculous it is beneficial both to the patients themselves and their fellows that they be treated as such. It is in this class of patients particularly that diagnostic tuberculin tests are warranted. The choice of test to be applied depends on a variety of circumstances and conditions.

It will be granted that whatever tuberculin test is used must be convenient, rapid in execution and manifestation, inexpensive, harmless and dependable before it can be recommended for general use for the examination of one or of many hundred patients. By convenient we must understand tests which are readily submitted to and easily and accurately followed. The rapidity of execution and manifestation of the reaction are points of weighty moment when many people are to be tested in a comparatively short time or when the patient happens to be the support of a family or the manager of a business. In the examination of school children, candidates for life insurance, for the army or the navy, in the routine inspection of factories or lodging-houses, etc., where the expense is borne by municipalities or by private individ-

---

*Read in the Section on Hygiene and Sanitary Science of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908.

Downloaded From: http://jama.jamanetwork.com/ by a University of Calgary User on 05/24/2015